Technical Paper 201

DEPARTMENT OF THE INTERIOR

UNIVERSITY LIBRARY

FRANKLIN K. LANE, Secretary

MAY 4 - 1918

U.S. BUREAU OF MINES

VAN. H. MANNING, Director

PRINCETON N J

ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES

DURING THE CALENDAR YEAR 1916

COMPILED BY

ALBERT H. FAY

WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

Generated on 2024-09-28 17:10 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Digitized by Google

Original from
PRINCETON UNIVERSITY

The Bureau of Mines, in carrying out one of the provisions of its organic act—to disseminate information concerning investigations made—prints a limited free edition of each of its publications.

When this edition is exhausted, copies may be obtained at cost price only through the Superintendent of Documents, Government Printing Office, Washington, D. C.

The Superintendent of Documents *is not an official of the Bureau of Mines.* His office is entirely separate and he should be addressed:

SUPERINTENDENT OF DOCUMENTS,
Government Printing Office,
Washington, D. C.

The general law under which publications are distributed prohibits the giving of more than one copy of a publication to one person. The price of this publication is 5 cents.

2

First edition. January, 1918.

Generated on 2024-09-28 17:11 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES DURING THE CALENDAR YEAR 1916.

Compiled by ALBERT H. FAY.

INTRODUCTION.

This paper, the third report of the Bureau of Mines on accidents at metallurgical works, shows a gratifying reduction in fatal accidents at both smelters and ore-dressing plants. The nonfatal injuries show an increase caused not so much by an increasing hazard as by the more complete returns received. The figures cover the returns from 150 smelting plants, and include copper, lead, zinc, and quicksilver smelters, as well as refineries. The iron blast furnaces are not included in the figures given herein. The ore-dressing plants represent concentrating plants for copper, lead, and zinc ores, stamp mills, cyanide plants, and iron-ore washers. The total number of men reported employed in the metallurgical plants, both smelters and ore-dressing plants, was 66,194, as compared with 49,891 in 1915, and 43,007 in 1914.

The number of fatalities reported at metallurgical plants was 83—33 at ore-dressing plants, 36 at smelters, and 14 at auxiliary works, including shops, yards, etc. The number of nonfatal injuries reported at ore-dressing plants was 3,184, at smelters 9,656, and at auxiliary works 2,240.

The fatality and injury rates, based on 300-day workers, for 1916 compared with previous years are given in the accompanying table.

Summary of labor and accidents at metallurgical works.

	Men employed.	Days of labor.	300-day workers.	Total number killed.	Number killed per 1,000 300-day workers.	Total number injured.	Number injured per 1,000 300-day workers.
Ore-dressing plants:							
1913	14,985	4,846,338	16,154	16	0.99	1,977	122.38
1914	15,128	4,567,529	15,225	23	1.51	1,434	94.19
1915	18,564	5,732,184	19,107	30	1.57	2,095	109.65
1916[a]	22,365	7,041,083	23,470	33	1.41	3,184	135.66
Smelting plants:[b]							
1913	20,564	7,292,766	24,309	47	1.93	4,247	174.71
1914	27,879	9,700,769	32,336	33	1.02	5,673	175.44
1915	31,327	10,878,486	36,262	38	1.05	5,718	157.69
1916[a]	43,829	14,809,046	49,363	36	.73	9,656	195.61

[a] Not including auxiliary works, as shops, yards, etc. [b] Exclusive of the iron and steel industry.

Generated on 2024-09-28 17:09 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

ACKNOWLEDGMENTS.

The data presented in this paper were voluntarily supplied by the officials and managers of the metallurgical companies at the request of the bureau, there being no law compelling such companies to render reports. The bureau gratefully acknowledges the hearty cooperation of the many officials who have answered its inquiries, and invites suggestions whereby the annual report of accidents at metallurgical plants may be improved so as to best serve the industry. For the compilation of the various tables the author is indebted to assistance rendered by W. W. Adams and Miss Lillian Chenoweth.

CLASSIFICATION OF INJURIES FOR 1916.

Many of the States now have compensation laws, and in order to conform with their classifications the bureau's classification of serious and slight injuries for 1916 is on a 14-day (2 weeks) basis.

The classification of injuries at mills, smelters, and auxiliary works includes three groups as follows:

1. Fatal	83
2. Serious (time lost, more than 14 days):	
(*a*) Permanent disability—	
Total	17
Partial	200
(*b*) Others	3,443
3. Slight (time lost, 1 to 14 days, inclusive)	11,420
Total	15,163

ACCIDENTS AT ORE-DRESSING PLANTS.

The number killed in the ore-dressing plants in 1916 was 33, or 1.41 per 1,000 300-day workers employed, as compared with 30 in 1915, when the fatality rate was 1.57. The total number of injuries in 1916 was 3,184, as compared with 2,095 in 1915.

Table 1 following shows the number of employees by States, the number of days' work performed, together with the number killed and injured. Table 2 shows the fatalities by causes and States, and Table 3 the nonfatal injuries, classified by causes and States, during the calendar year 1916.

Table 4 is a summary of the accidents by causes and by States for the years 1913, 1914, 1915, and 1916.

ACCIDENTS AT SMELTERS.

In 1916 the number of men killed at smelting plants was 36, or 0.73 per 1,000 300-day workers, as compared with 1.05 per 1,000 in 1915. There were reported 9,656 injuries, or 195.61 per 1,000. Table 5 represents a summary of accidents at smelting plants, by causes and by

Generated on 2024-09-28 17:15 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

States, showing the number killed and injured during the calendar years 1913, 1914, 1915, and 1916.

Table 1 shows the number of men employed and the number of days worked at smelters by States for the year 1916. It also shows the total number killed and injured for each State. Tables 2 and 3 show fatalities and injuries by causes and States for 1916.

ACCIDENTS AT AUXILIARY WORKS.

Auxiliary works are intended to include machine shops, carpenter shops, yards, and general construction, all of which though a part of the metallurgical plants, should not be included in the actual operating departments. The returns for 1916 show 14,007 men employed, with 14 fatalities and 2,240 injuries. Reduced to the 300-day basis, this represents 15,763 300-day workers, with a fatality rate of 0.89 and a nonfatal-injury rate of 142.10 per 1,000. Fifty per cent of the fatalities were due to falls of persons, and falling objects, and 29 per cent of the nonfatal injuries were due to the same causes.

CAUSES OF ACCIDENTS.

The percentage of accidents due to any one cause is given in Table 8. In the ore-dressing plants, machinery was responsible for 33 per cent of all fatalities, and 18 per cent of all injuries. Similar figures for smelting plants are much smaller, for the reason that there is more machinery in use in ore-dressing plants than at smelters, and the men are usually in closer contact with the machinery, as, for example, at jigs, tables, stamps, rolls, and crushers. There are many revolving shafts, a large number of which have projecting keys, moving belts, wheels, and cams within the reach of the operator. The machinery at smelting plants is usually confined to the power house, where the blowers, engines, and dynamos are placed, and to overhead cranes, almost all of which are entirely out of the reach of the regular smelter employees.

Six per cent of the fatalities at ore-dressing plants were due to falls of persons, whereas at the smelters the fatalities due to falls of persons represented 25 per cent of the total. Fatalities due to flying or falling objects represented 11 per cent at smelters and 3 per cent at ore-dressing plants.

Haulage systems caused 17 per cent of the fatalities at smelting plants and 21 per cent at ore-dressing plants. Six per cent of the nonfatal injuries at ore-dressing plants were due to haulage, whereas at smelters 10 per cent were due to this cause.

At smelting plants burns from hot metal, slag, etc., claimed 11 per cent of the fatalities and 25 per cent of the nonfatal injuries.

Generated on 2024-09-28 17:09 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

The tables presented herein call attention to the principal causes of accidents at these works and should serve as guides for the safety engineer to show where it will be possible for him to do his work most efficiently and to accomplish the best results.

STATISTICAL TABLES.

The tables showing the classification and the number of accidents at metallurgical works in the United States during the calendar year 1916 follow:

Generated on 2024-09-28 17:09 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

Generated on 2024-09-28 17:12 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

TABLE 1.—*Number of men employed, number of days worked, and number of men killed and injured at* **metallurgical plants** *in the United States, in the calendar year* **1916.**

State.	Ore-dressing plants.					Smelting plants.					Auxiliary works.					Widows.	Orphans.
	Men employed.	Days of labor.	Average days active.	Killed.	Injured.	Men employed.	Days of labor.	Average days active.	Killed.	Injured.	Men employed.	Days of labor.	Average days active.	Killed.	Injured.		
Alabama	92	16,488	179	.....	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alaska	925	333,360	360	.....	127	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	2,380	790,821	332	3	524	3,470	1,210,377	349	1	1,112	2,512	857,607	341	4	385	3	6
Arkansas	173	42,730	247	.....	20	410	75,240	184	.....	154	10	2,040	204	.....	.....	.....	.....
California	794	234,004	295	.....	118	1,146	382,190	333	1	224	280	101,733	363	.....	56	1	2
Colorado	1,382	414,681	300	4	176	3,099	929,559	300	1	508	.....	.....	.....	.....	.....	2	.....
Georgia	68	19,430	286	.....	9	.....	.....	.....	.....	.....	17	5,533	325	.....	.....	.....	.....
Idaho	611	188,673	309	.....	75	.....	.....	.....	.....	.....	88	20,413	232	.....	2	.....	.....
Illinois	58	10,742	185	.....	4	4,735	1,630,241	344	2	1,356	1,325	465,142	351	.....	300	1	.....
Kansas	80	23,853	298	.....	7	3,611	1,224,975	339	3	695	16	5,355	335	.....	9	2	.....
Maryland	9	1,395	155	.....	1	1,300	456,500	351	1	605	8	1,240	155	.....	.....	1	5
Michigan	2,255	703,788	312	2	137	1,001	326,669	326	1	251	77	26,558	345	.....	1	1	.....
Minnesota	286	71,663	251	.....	48	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri	1,375	399,764	291	1	186	1,532	541,880	354	2	317	815	252,415	310	.....	103	2	6
Montana	2,153	645,679	300	3	168	3,200	979,580	306	3	333	3,027	979,595	324	6	307	9	10
Nevada	1,556	514,024	330	1	133	870	305,372	351	.....	90	70	18,681	267	.....	3	1	2
New Jersey	715	241,165	337	3	45	4,870	1,778,862	365	6	646	148	53,815	364	.....	14	3	10
New Mexico	1,346	464,224	345	4	310	48	16,464	343	.....	.....	14	5,110	365	.....	.....	1	.....
New York	567	152,632	269	4	73	570	154,200	271	1	361	50	14,778	296	.....	2	4	8
North Carolina	55	15,186	276	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oklahoma	94	21,283	226	.....	15	5,181	1,646,034	318	1	817	1,381	457,932	332	.....	187	.....	.....
Oregon	77	11,969	155	.....	2	22	7,568	344	.....	.....	33	9,047	274	.....	.....	.....	.....
Pennsylvania	25	7,830	313	.....	1	2,583	931,710	361	3	610	1,398	507,510	363	2	168	4	9
South Dakota	362	115,978	320	.....	51	16	2,359	147	.....	1	.....	.....	.....	.....	.....	.....	.....
Tennessee	460	120,370	262	1	48	200	70,200	351	1	241	123	42,705	347	.....	136	1	.....
Texas	60	17,370	290	.....	7	963	351,495	365	.....	179	215	76,961	358	1	102	.....	.....
Utah	3,017	1,073,745	356	5	711	2,401	878,426	365	8	622	857	310,352	362	.....	231	7	6
Vermont	137	42,074	307	.....	8	8	400	50	.....	2	.....	.....	.....	.....	.....	.....	.....
Virginia	475	136,038	286	1	43	251	86,956	346	.....	39	418	136,512	327	1	11	1	3
Washington	17	4,059	239	.....	.....	1,045	351,275	336	1	135	642	234,330	365	.....	121	.....	.....
West Virginia	.....	.....	.....	.....	.....	932	339,024	364	.....	148	375	125,791	335	.....	94	.....	.....
Wisconsin	421	112,854	268	.....	90	5	1,500	300	.....	1	85	13,400	158	.....	8	.....	.....
Other States	340	93,211	274	1	35	360	129,990	361	.....	209	23	4,455	194	.....	.....	.....	.....
Total	**22,365**	**7,041,083**	**315**	**33**	**3,184**	**43,829**	**14,809,046**	**338**	**36**	**9,656**	**14,007**	**4,729,010**	**338**	**14**	**2,240**	**44**	**67**

Digitized by Google
Original from PRINCETON UNIVERSITY

TABLE 2.—*Number of men* ***killed*** *at* ***metallurgical plants***

State.	Ore-dressing and milling accidents (including stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills).																
	1 Haulage system.	2 Railway cars or locomotives.	3 Crushers, rolls, or stamps.	4 Tables, jigs, etc.	5 Other machinery.	6 Falls of persons.	7 Suffocation in ore bins.	8 Falling objects (rocks, timbers, etc.).	9 Cyanide or other poisoning.	10 Scalding (steam or water).	11 Electricity.	12 Hand tools, axes, bars, etc.	13 Nails, splinters, etc.	14 Flying pieces of rock from sledging or crushing.	15 Other causes.	Total.	
Alabama																	
Alaska																	
Arizona					1										2	3	
Arkansas																	
California																	
Colorado	1				2			1								4	
Georgia																	
Idaho																	
Illinois																	
Kansas																	
Maryland																	
Michigan		1								1						2	
Minnesota																	
Missouri						1										1	
Montana	1				2											3	
Nevada					1											1	
New Jersey					2						1					3	
New Mexico		1				1	1								1	3	
New York					2					1	1					4	
North Carolina																	
Oklahoma																	
Oregon																	
Pennsylvania																	
South Dakota																	
Tennessee					1											1	
Texas																	
Utah		1					2					1			1	5	
Vermont																	
Virginia		1														1	
Washington																	
West Virginia																	
Wisconsin																	
Other States	1															1	
Total	3	4			11	2	3	1		2	2	1			4	33	

Generated on 2024-09-28 17:09 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

in the United States, by causes, in the calendar year ***1916.***

| Smelter accidents (including blast, reverberatory, and roasting furnaces; converters, casting department, and refineries). | | |

TABLE 3.—*Number of men* ***injured*** *at* ***metallurgical plants***

State.	Ore-dressing and milling accidents (including stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills).															Total.
	1 Haulage system.	2 Railway cars or locomotives.	3 Crushers, rolls, or stamps.	4 Tables, jigs, etc.	5 Other machinery.	6 Falls of persons.	7 Suffocation in ore bins.	8 Falling objects (rocks, timbers, etc.).	9 Cyanide or other poisoning.	10 Scalding (steam or water).	11 Electricity.	12 Hand tools, axes, bars, etc.	13 Nails, splinters, etc.	14 Flying pieces of rock from sledging or crushing.	15 Other causes.	
Alabama	....	....	....	....	1	2	....	4	....	....	....	1	1	....	....	9
Alaska	17	1	24	1	18	6	....	6	1	1	1	8	6	2	35	127
Arizona	11	3	21	13	55	69	2	56	1	7	13	74	39	4	156	524
Arkansas	3	....	3	1	1	4	....	1	....	1	....	....	2	1	3	20
California	3	....	14	2	18	14	....	6	1	....	1	15	12	3	29	118
Colorado	7	2	15	4	44	32	1	18	....	....	3	13	9	9	19	176
Georgia	....	....	....	5	2	....	....	....	....	1	....	....	....	....	....	8
Idaho	4	....	2	3	8	14	....	4	....	....	1	6	6	3	24	75
Illinois	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	2
Kansas	....	....	....	1	....	2	....	1	....	....	....	....	1	2	....	7
Maryland	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Michigan	2	4	7	2	20	21	....	6	....	5	1	13	4	1	51	137
Minnesota	2	....	....	1	3	2	....	15	....	2	....	8	1	1	13	48
Missouri	2	4	14	11	6	27	....	6	....	....	2	17	4	27	66	186
Montana	15	4	11	11	20	22	....	10	3	1	3	10	2	3	53	168
Nevada	4	....	6	1	15	21	....	14	4	3	1	10	1	5	48	133
New Jersey	1	1	1	1	7	8	....	5	....	....	1	....	3	....	17	45
New Mexico	13	3	7	8	8	48	1	26	....	....	11	39	29	4	113	310
New York	6	2	5	1	8	4	....	9	....	....	1	6	7	1	23	73
North Carolina	....	....	....	....	....	1	....	1	....	....	....	1	....	....	....	3
Oklahoma	....	....	....	1	1	8	....	2	....	....	....	....	1	1	1	15
Oregon	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	2
Pennsylvania	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
South Dakota	2	....	7	....	2	5	....	2	....	....	1	4	1	9	18	51
Tennessee	4	1	3	1	7	5	....	4	....	2	....	10	1	1	9	48
Texas	....	....	....	....	1	2	....	1	....	1	....	....	....	1	1	7
Utah	40	15	12	10	66	36	....	146	....	10	12	117	29	20	198	711
Vermont	....	....	1	....	5	1	....	....	....	....	....	....	....	1	....	8
Virginia	1	1	....	....	....	7	....	4	3	....	1	3	3	6	14	43
Washington	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
West Virginia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Wisconsin	8	....	13	3	9	9	....	10	....	1	....	3	8	3	23	90
Other States	1	1	2	1	8	2	....	6	....	....	....	2	1	1	10	35
Total	146	42	168	82	336	373	4	363	13	35	53	360	171	103	929	3,184

Generated on 2024-09-28 17:18 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

in the United States, by causes, in the calendar year ***1916.***

Smelter accidents (including blast, reverberatory, and roasting furnaces; converters, casting department, and refineries).																Accidents at auxiliary works (yards, shops, construction, etc.).											
Haulage system.	Railway cars or locomotives.	Cranes.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Flying or falling objects (rocks, timbers, etc.).	Gas (burns or asphyxiation).	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling).	Hot-metal explosions.	Other causes.	Total.	Haulage systems, cars, motors, etc.	Railway cars or locomotives.	Falls of persons.	Falling objects (rocks, timbers, etc.).	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Failure of ladder, scaffold, or other support.	Handling hot materials.	Other causes.	Total.
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
57	16	37	31	86	..	186	2	7	10	119	11	239	24	287	1,112	20	11	32	34	21	63	4	39	10	15	136	385
			3	5		1				2	5	6		132	154												
18	8	2	3	27	..	43	3	2	1	15	5	44	6	47	224	3	1	6	15	2	7	..	4	2	3	13	56
138	4	...	21	53	..	93	1	5	2	31	6	99	15	40	508												
																		1					1				2
92	8	11	58	77	..	155	65	27	2	139	38	261	49	374	1,356	23	1	21	37	21	88	..	23	1	10	75	300
36	7	1	40	56	..	51	7	26	..	45	21	227	9	169	695	4	..	1	2	...	1	..			..	1	9
66	5	10	38	64	..	139	1	6	3	31	7	52	4	179	605												
14	...	...	12	18	..	7	...	2	..	18	...	126	...	54	251						1						1
20	2	1	...	26	1	35	11	4	..	28	65	49	27	48	317	6	7	16	29	3	21	2	1			18	103
33	...	7	13	34	..	78	...	3	1	25	3	43	22	71	333	10	2	62	89	13	32	3	24	..	5	67	307
2	1	3	8	6	..	39	2	2	2	6	...	7	...	12	90	1	..	1	...	...	...	1	...	...	..	..	3
100	25	30	11	61	..	53	1	12	1	52	6	85	10	199	646	2	..	1	2	...	...	...	...	2	..	7	14
24	...	2	15	17	..	119	...	1	1	33	7	109	1	32	361	1	..	...	...	...	...	...	1	...	...	...	2
17	2	1	50	34	..	106	11	5	6	71	38	281	11	184	817	8	..	11	25	5	35	..	18	17	2	66	187
41	4	4	8	35	..	32	2	21	..	106	15	131	13	198	610	22	11	13	14	5	18	5	7	1	7	65	168
			1												1												
20	1	1	12	21	..	40	1	1	3	19	5	42	1	74	241	...	16	15	...	...	19	..	24	1	3	58	136
55	1	...	2	19	..	44	...	2	1	11	1	25	8	10	179	8	2	10	33	1	6	4	14	5	6	13	102
59	32	12	32	94	..	128	1	2	3	52	6	148	6	47	622	5	7	38	81	7	27	6	22	7	5	26	231
												1	...	1	2												
...	...	2	3	3	..	13	...	...	...	2	1	4	...	11	39	1	..	3	1	...	1	..	1	2	2	...	11
19	1	5	6	11	..	35	1	3	..	12	10	14	3	15	135	5	8	22	29	5	7	..	5	3	2	35	121
3	...	...	...	4	..	...	...	1	..	33	2	102	...	3	148	9	..	4	2	65	7	2	3	...	...	2	94
														1	1			1	4	1						2	8
...	...	1	18	6	..	41	3	...	..	25	...	68	8	39	209	...	..	...	...	...	...	...	...	...	...	...	...
814	117	130	385	757	1	1,438	112	132	36	875	252	2,163	217	2,227	9,656	128	66	258	397	149	333	27	187	51	60	584	2,240

Generated on 2024-09-28 17:13 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

TABLE 4.—*Summary of accidents at* ***ore-dressing plants*** *in the United States,* ***1913 to 1916.***

	Killed.				Injured.			
	1913	1914	1915	1916	1913	1914	1915	1916
Accidents by causes:								
1. Haulage system	1	.....	3	3	98	79	106	146
2. Railway cars or locomotives	1	3	2	4	34	38	17	42
3. Crushers, rolls, or stamps	.....	2	5	.....	64	64	129	168
4. Tables, jigs, etc	.....	.....	.....	.....	65	46	59	82
5. Other machinery	2	6	7	11	219	170	299	336
6. Falls of persons	3	3	6	2	238	205	249	373
7. Suffocation in ore bins	1	2	3	3	.....	2	3	4
8. Falling objects (rocks, timbers, etc.)	3	3	.....	1	367	222	192	363
9. Cyanide or other poisoning	1	.....	.....	.....	8	9	23	13
10. Scalding (steam or water)	.....	.....	.....	2	24	9	12	35
11. Electricity	1	2	3	2	21	30	38	53
12. Hand tools, axes, bars, etc	.....	.....	.....	1	199	133	235	360
13. Nails, splinters, etc	.....	.....	.....	.....	74	78	131	171
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	.....	132	50	76	109
15. Other causes	3	2	1	4	434	299	526	929
Total	**16**	**23**	**30**	**33**	**1,977**	**1,434**	**2,095**	**3,184**
Accidents by States:								
Alabama	.....	.....	1	.....	16	1	6	9
Alaska	(a)	1	.....	.....	(a)	30	73	127
Arizona	4	5	1	3	335	287	350	524
Arkansas [b]	.....	.....	.....	.....	.....	.....	2	20
California	.....	1	2	.....	36	111	91	118
Colorado	5	2	7	4	127	103	153	176
Georgia [b]	.....	.....	.....	.....	.....	.....	3	9
Idaho	1	1	1	.....	30	19	55	75
Illinois	.....	.....	.....	.....	34	3	3	4
Kansas [b]	.....	.....	.....	.....	.....	.....	2	7
Maryland [b]	.....	.....	.....	.....	.....	.....	.....	1
Michigan	.....	1	.....	2	25	51	112	137
Minnesota [b]	.....	.....	.....	.....	.....	.....	22	48
Missouri	1	2	2	1	209	180	155	186
Montana	1	4	5	3	189	121	292	168
Nevada	.....	2	4	1	83	83	147	133
New Jersey	.....	.....	1	3	29	27	26	45
New Mexico	1	.....	2	4	111	95	131	310
New York	.....	.....	1	4	.....	12	38	73
North Carolina [b]	.....	.....	.....	.....	.....	.....	4	3
Oklahoma	.....	.....	.....	.....	11	35	3	15
Oregon	.....	.....	.....	.....	3	5	11	2
Pennsylvania [b]	.....	.....	.....	.....	.....	.....	.....	1
South Dakota	.....	.....	.....	.....	34	10	33	51
Tennessee	.....	.....	.....	1	13	1	27	48
Texas	.....	.....	.....	.....	.....	7	.....	7
Utah	2	4	2	5	531	211	263	711
Vermont [b]	.....	.....	.....	.....	.....	.....	3	8
Virginia	.....	.....	1	1	20	5	35	43
Washington [b]	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia [b]	.....	.....	.....	.....	.....	.....	.....	.....
Wisconsin	.....	.....	.....	.....	68	16	51	90
Other states	1	.....	.....	1	73	21	4	35
Total	**16**	**23**	**30**	**33**	**1,977**	**1,434**	**2,095**	**3,184**

[a] No report received. [b] Included in "Other States" prior to 1915.

Generated on 2024-09-28 17:09 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

TABLE 5.—*Summary of accidents at* ***smelting plants*** *in the United States,* ***1913*** *to* ***1916.***

	Killed.				Injured.			
	1913	1914	1915	1916	1913	1914	1915	1916
Accidents by causes:								
16. Haulage system (cars, motors, etc.)	5	3	10	4	386	495	529	814
17. Railway cars and locomotives	5	7	2	2	75	111	61	117
18. Cranes	4	.....	2	5	68	55	58	130
19. Other machinery	8	3	5	3	253	250	290	385
20. Falls of persons	10	6	3	9	364	620	499	757
21. Suffocation in ore bins	1	2	1	1	13	1	8	1
22. Flying or falling objects (rocks, timbers, etc.)	3	1	1	4	603	1,052	914	1,438
23. Gas (burns or asphyxiation)	.....	.....	3	1	18	59	68	112
24. Scalding (steam or water)	.....	1	2	1	45	62	46	132
25. Electricity	2	2	4	1	57	49	46	36
26. Hand tools, axes, bars, etc	.....	.....	.....	.....	423	586	633	875
27. Nails, splinters, etc	.....	.....	.....	.....	79	96	146	252
28. Burns from matte, slag, or molten metal (pouring or spilling)	4	2	3	1	777	959	894	2,163
29. Hot-metal explosions	2	.....	1	3	148	162	160	217
30. Other causes	3	6	1	1	938	1,116	1,366	2,227
Total	**47**	**33**	**38**	**36**	**4,247**	**5,673**	**5,718**	**9,656**
Accidents by States:								
Arizona	15	3	7	1	805	553	574	1,112
Arkansas [a]	.....	.....	.....	.....	.....	.....	.....	154
California	2	1	.....	1	144	163	163	224
Colorado	1	2	6	1	295	636	404	508
Illinois	2	3	2	2	271	697	782	1,356
Kansas	.....	.....	1	3	63	89	408	695
Maryland [b]	.....	.....	.....	1	.....	.....	.....	605
Michigan [a]	.....	.....	.....	1	.....	.....	.....	251
Missouri	.....	.....	3	2	353	257	304	317
Montana	4	6	6	3	390	538	457	333
Nevada	5	1	.....	.....	128	33	58	90
New Jersey	2	3	4	6	200	622	630	646
New Mexico	.....	.....	.....	.....	.....	.....	.....	.....
New York	1	1	(c)	1	15	49	(c)	361
Oklahoma	3	1	1	1	121	97	262	817
Oregon	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	.....	1	2	3	251	205	339	610
South Dakota	.....	.....	.....	.....	.....	.....	.....	1
Tennessee	.....	1	1	1	372	326	249	241
Texas [a]	.....	.....	.....	.....	.....	.....	.....	179
Utah	10	5	3	8	554	605	437	622
Vermont	.....	.....	.....	.....	.....	.....	.....	2
Virginia [a]	.....	.....	.....	.....	.....	.....	.....	39
Washington [a]	.....	.....	.....	1	.....	.....	.....	135
West Virginia	1	.....	1	.....	86	61	106	148
Wisconsin [a]	.....	.....	.....	.....	.....	.....	.....	1
Other States	1	5	1	.....	199	742	545	209
Total	**47**	**33**	**38**	**36**	**4,247**	**5,673**	**5,718**	**9,656**

[a] Included in "Other States" prior to 1916. [b] No report received prior to 1916. [c] No report received.

Generated on 2024-09-28 17:15 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

TABLE 6.—*Days worked at* ***metallurgical plants*** *in the United States,* ***1913*** *to* ***1916.***

State.	Ore-dressing plants.				Smelting plants.			
	1913	1914	1915	1916	1913	1914	1915	1916
Alabama	31,250	17,250	5,572	16,488	.....	.....	.....	.....
Alaska	.....	76,046	159,078	333,360	.....	.....	.....	.....
Arizona	458,681	437,061	551,719	790,821	1,064,714	875,543	910,120	1,210,377
Arkansas	.....	(a)	22,400	42,730	.....	.....	.....	75,240
California	193,403	153,471	243,708	234,004	351,610	314,162	371,847	382,190
Colorado	260,052	292,491	365,678	414,681	989,335	1,006,670	839,587	929,559
Georgia	(a)	(a)	14,540	19,430	.....	.....	.....	.....
Idaho	105,023	116,527	131,352	188,673	.....	.....	.....	.....
Illinois	44,794	36,325	(a)	10,742	697,120	1,167,544	1,247,660	1,630,241
Kansas	(a)	(a)	25,584	23,853	268,870	337,890	736,108	1,224,975
Maryland	.....	.....	(a)	1,395	.....	.....	.....	456,500
Michigan	152,121	493,875	721,634	703,788	(a)	(a)	224,250	326,669
Minnesota	(a)	(a)	48,385	71,663	.....	.....	.....	.....
Missouri	489,091	401,615	394,850	399,764	392,467	353,126	400,689	541,880
Montana	903,414	517,458	796,575	645,679	446,645	792,731	1,200,496	979,580
Nevada	509,108	457,581	462,322	514,024	303,846	253,006	259,972	305,372
New Jersey	115,420	135,312	182,230	241,165	275,288	1,214,362	1,487,345	1,778,862
New Mexico	252,772	235,843	263,494	464,224	(a)	.....	(a)	16,464
New York	.....	31,151	104,382	152,632	35,500	64,500	.....	154,200
North Carolina	(a)	(a)	18,265	15,186	.....	.....	.....	.....
Oklahoma	83,795	118,217	26,397	21,283	431,065	424,145	612,835	1,646,034
Oregon	11,033	33,960	16,879	11,969	(a)	.....	(a)	7,568
Pennsylvania	(a)	.....	(a)	7,830	549,640	452,803	661,376	931,710
South Dakota	117,458	129,410	138,182	115,978	(a)	.....	.....	2,359
Tennessee	51,822	27,131	79,091	120,370	164,700	105,229	(a)	70,200
Texas	18,964	18,465	.....	17,370	(a)	(a)	335,435	351,495
Utah	841,164	719,243	601,358	1,073,745	587,285	1,013,095	802,270	878,426
Vermont	.....	.....	36,822	42,074	.....	.....	.....	400
Virginia	57,874	24,330	153,397	136,038	(a)	(a)	(a)	86,956
Washington	960	3,520	(a)	4,059	(a)	(a)	315,725	351,275
West Virginia	.....	.....	.....	.....	329,605	294,015	304,368	339,024
Wisconsin	53,678	39,624	80,296	112,854	.....	(a)	(a)	1,500
Other States	94,461	51,623	87,994	93,211	405,076	1,031,948	168,403	129,990
Total	**4,846,338**	**4,567,529**	**5,732,184**	**7,041,083**	**7,292,766**	**9,700,769**	**10,878,486**	**14,809,046**

a Included in "Other States."

Generated on 2024-09-28 17:13 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

TABLE 7.—*Summary of men employed at* ***smelters*** *and* ***ore-dressing plants*** *in the United States,* ***1913*** *to* ***1916.***

State.	Ore-dressing plants.				Smelting plants.			
	1913	1914	1915	1916	1913	1914	1915	1916
Alabama	104	58	19	55	.....	.....	.....	.....
Alaska	.....	253	530	1,111	.....	.....	.....	.....
Arizona	1,529	1,457	1,839	2,637	3,549	2,919	3,034	4,034
Arkansas	.....	.....	75	142	.....	.....	.....	251
California	645	512	812	780	1,172	1,047	1,239	1,274
Colorado	867	975	1,219	1,382	3,298	3,356	2,799	3,098
Georgia	.....	.....	48	65	.....	.....	.....	.....
Idaho	350	388	438	629	.....	.....	.....	.....
Illinois	149	121	.....	36	2,324	3,892	4,159	5,434
Kansas	.....	.....	85	79	896	1,126	2,454	4,083
Maryland	.....	.....	.....	5	.....	.....	.....	1,522
Michigan	507	1,646	2,406	2,346	.....	.....	748	1,089
Minnesota	.....	.....	161	239	.....	.....	.....	.....
Missouri	1,630	1,339	1,316	1,332	1,308	1,177	1,336	1,806
Montana	3,011	1,725	2,655	2,152	1,489	2,642	4,002	3,265
Nevada	1,697	1,525	1,541	1,713	1,013	843	866	1,018
New Jersey	385	451	607	804	917	4,048	4,958	5,929
New Mexico	842	786	878	1,547	.....	.....	.....	55
New York	.....	104	348	509	118	215	.....	514
North Carolina	.....	.....	61	51	.....	.....	.....	.....
Oklahoma	279	394	88	71	1,437	1,414	2,043	5,487
Oregon	37	113	56	40	.....	.....	.....	25
Pennsylvania	.....	.....	.....	26	1,832	1,509	2,205	3,106
South Dakota	392	431	461	387	.....	.....	.....	8
Tennessee	173	90	264	401	549	351	.....	234
Texas	63	62	.....	58	.....	.....	1,118	1,172
Utah	2,804	2,398	2,005	3,579	1,958	3,377	2,674	2,928
Vermont	.....	.....	123	140	.....	.....	.....	2
Virginia	193	81	511	453	.....	.....	.....	290
Washington	3	12	.....	14	.....	.....	1,052	1,171
West Virginia	.....	.....	.....	.....	1,099	980	1,014	1,130
Wisconsin	179	132	268	376	.....	.....	.....	5
Other States	315	172	293	311	1,350	3,440	561	433
Total	**16,154**	**15,225**	**19,107**	**23,470**	**24,309**	**32,336**	**36,262**	**49,363**

Generated on 2024-09-28 17:19 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

TABLE 8.—*Percentage of accidents, by causes, at* ***metallurgical plants*** *in the United States,* ***1916.***

Cause of accident.	Fatal.			Nonfatal.		
	Number killed.	Per cent of group total.	Per cent of grand total.	Number injured.	Per cent of group total.	Per cent of grand total.
Ore-dressing plants:						
1. Haulage system	3	9.09	3.62	146	4.59	.97
2. Railway cars or locomotives	4	12.12	4.82	42	1.32	.28
3. Crushers, rolls, or stamps	.....	.....	.....	168	5.28	1.11
4. Tables, jigs, etc	.....	.....	.....	82	2.57	.54
5. Other machinery	11	33.34	13.25	336	10.55	2.23
6. Falls of persons	2	6.06	2.41	373	11.71	2.47
7. Suffocation in ore bins	3	9.09	3.62	4	.13	.03
8. Falling objects (rocks, timbers, etc.)	1	3.03	1.20	363	11.40	2.41
9. Cyanide or other poisoning	.....	.....	.....	13	.41	.09
10. Scalding (steam or water)	2	6.06	2.41	35	1.10	.23
11. Electricity	2	6.06	2.41	53	1.66	.35
12. Hand tools, axes, bars, etc	1	3.03	1.20	360	11.31	2.39
13. Nails, splinters, etc	.....	.....	.....	171	5.37	1.13
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	109	3.42	.72
15. Other causes	4	12.12	4.82	929	29.18	6.16
Total	**33**	**100.00**	**39.76**	**3,184**	**100.00**	**21.11**
Smelting plants.						
16. Haulage system	4	11.11	4.82	814	8.43	5.40
17. Railway cars or locomotives	2	5.55	2.41	117	1.21	.77
18. Cranes	5	13.89	6.03	130	1.35	.86
19. Other machinery	3	8.33	3.62	385	3.99	2.55
20. Falls of persons	9	25.00	10.85	757	7.84	5.02
21. Suffocation in ore bins	1	2.78	1.20	1	.01	.01
22. Flying or falling objects (rocks, timbers, etc.)	4	11.11	4.82	1,438	14.89	9.54
23. Gas (burns or asphyxiation)	1	2.78	1.20	112	1.16	.74
24. Scalding (steam or water)	1	2.78	1.20	132	1.37	.88
25. Electricity	1	2.78	1.20	36	.37	.24
26. Hand tools, axes, bars, etc	.....	.....	.....	875	9.06	5.80
27. Nails, splinters, etc	.....	.....	.....	252	2.61	1.67
28. Burns from matte, slag, or molten metal (pouring or spilling)	1	2.78	1.20	2,163	22.40	14.34
29. Hot-metal explosions	3	8.33	3.62	217	2.25	1.44
30. Other causes	1	2.78	1.20	2,227	23.06	14.77
Total	**36**	**100.00**	**43.37**	**9,656**	**100.00**	**64.03**
Auxiliary works:						
31. Haulage system, cars, motors, etc	1	7.14	1.20	128	5.71	.85
32. Railway cars or locomotives	1	7.14	1.20	66	2.95	.44
33. Falls of persons	5	35.72	6.03	258	11.52	1.71
34. Falling objects (rocks, timbers, etc.)	2	14.29	2.41	397	17.72	2.63
35. Nails, splinters, etc	.....	.....	.....	149	6.65	.99
36. Hand tools, axes, bars, etc	.....	.....	.....	333	14.87	2.21
37. Electricity	2	14.29	2.41	27	1.20	.18
38. Machinery	1	7.14	1.20	187	8.35	1.24
39. Failure of ladder, scaffold, or other support	.....	.....	.....	51	2.28	.34
40. Handling hot materials	1	7.14	1.20	60	2.68	.40
41. Other causes	1	7.14	1.20	584	26.07	3.87
Total	**14**	**100.00**	**16.87**	**2,240**	**100.00**	**14.86**
Grand total	**83**	.....	**100.00**	**15,080**	.....	**100.00**

ACCIDENTS AT COPPER METALLURGICAL PLANTS.

As the mills and smelters treating copper ores represent such an important part of the metallurgical industry of the United States, as well as a branch that is readily segregated, Tables 9 and 10 following have been compiled from the reports of a number of selected companies whose records appear reasonably complete, and at whose plants efforts are being exerted to maintain safety organizations. These figures represent 16 ore-dressing plants and 20 smelters in various parts of the country, employing 8,056 men at mills and 9,417

Generated on 2024-09-28 17:18 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

at smelters in 1915; and 17 mills and 19 smelters employing respectively 8,388, and 8,719 men in 1916. The figures are for approximately the same companies for each year and it is believed are fairly representative of the industry.

TABLE 9.—*Summary of accident data at copper* ***metallurgical plants, 1915 and 1916.***

	1915		1916	
	Mills.	Smelters.	Mills.	Smelters.
Number of plants	16	20	17	19
Men employed	8,056	9,417	8,388	8,719
Number of 300-day workers	8,838	10,439	9,422	9,826
Total days' labor (shifts)	2,651,313	3,131,577	2,826,710	2,947,719
Days worked during year	329	332	337	338
Number killed	10	15	10	8
Number injured	1,009	1,686	1,493	2,187
Fatality rate per 1,000, 300-day workers	1.13	1.44	1.06	.81
Injury rate per 1,000, 300-day workers	114.17	161.51	158.46	222.57

TABLE 10.—*Accidents by causes, at copper* ***metallurgical plants, 1915 and 1916.***

	1915				1916			
	Mills.		Smelters.		Mills.		Smelters.	
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
Haulage system (cars, motors, etc.)	1	51	3	150	1	43	1	125
Railway cars or locomotives	.....	9	.....	12	1	11	.....	47
Crushers, rolls, or stamps	.....	16	.....	3	.....	25	.....	.....
Tables, jigs, etc	.....	32	.....	.....	.....	39	.....	.....
Cranes	.....	.....	2	23	.....	.....	.....	68
Other machinery	1	103	2	110	2	132	.....	76
Falls of persons	3	146	2	167	1	158	2	189
Suffocation in ore bins	1	2	1	7	1	2	.....	.....
Falling objects (rocks, timbers, etc.)	1	111	1	316	.....	221	2	341
Cyanide or other posioning	.....	5	.....	.....	.....	4	.....	.....
Gas (burning or asphyxiation)	.....	.....	.....	2	.....	.....	.....	6
Scalding (steam or water)	.....	7	.....	17	.....	11	.....	20
Electricity	1	19	1	24	.....	37	1	15
Hand tools, axes, bars, etc	.....	133	.....	219	.....	193	.....	188
Nails, splinters, etc	.....	57	.....	49	.....	98	.....	28
Flying pieces of rock from sledge or crusher	.....	40	.....	.....	.....	20	.....	.....
Burns from matte, slag, or molten metal	.....	.....	2	201	.....	.....	.....	453
Hot-metal explosions	.....	.....	1	53	.....	.....	2	48
Other causes	2	278	.....	333	4	499	.....	583
Total	10	1,009	15	1,686	10	1,493	8	2,187

PUBLICATIONS ON ACCIDENTS STATISTICS.

A limited supply of the following publications of the Bureau of Mines has been printed and is available for free distribution until the edition is exhausted. Requests for all publications can not be granted, and to insure equitable distribution applicants are requested to limit their selection to publications that may be of especial interest to them. Requests for publications should be addressed to the Director, Bureau of Mines.

Generated on 2024-09-28 17:18 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY

The Bureau of Mines issues a list showing all its publications available for free distribution as well as those obtainable only from the Superintendent of Documents, Government Printing Office, on payment of the price of printing. Interested persons should apply to the Director, Bureau of Mines, for a copy of the latest list.

PUBLICATIONS AVAILABLE FOR FREE DISTRIBUTION.

BULLETIN 115. Coal-mine fatalities in the United States, 1870–1914, with statistics of coal production, labor, and mining methods, by States and calendar years, compiled by A. H. Fay. 1916. 370 pp., 3 pls., 13 figs.

TECHNICAL PAPER 46. Quarry accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 32 pp.

TECHNICAL PAPER 61. Metal-mine accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1913. 76 pp., 1 fig.

TECHNICAL PAPER 92. Quarry accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 76 pp.

TECHNICAL PAPER 118. Coke-oven accidents in the United States during the calendar years 1913 and 1914, compiled by A. H. Fay. 1915. 16 pp.

TECHNICAL PAPER 124. Accidents at metallurgical works in the United States during the calendar years 1913 and 1914, compiled by A. H. Fay. 1915. 28 pp.

TECHNICAL PAPER 128. Quarry accidents in the United States during the calendar year 1914, compiled by A. H. Fay. 1915. 45 pp.

TECHNICAL PAPER 129. Metal-mine accidents in the United States during the calendar year 1914, compiled by A. H. Fay. 1915. 96 pp., 1 pl., 3 figs.

TECHNICAL PAPER 151. Coke-oven accidents in the United States during the calendar year 1915, compiled by A. H. Fay. 1916. 18 pp.

TECHNICAL PAPER 164. Accidents at metallurgical works in the United States during the calendar year 1915, compiled by A. H. Fay. 1916. 20 pp.

TECHNICAL PAPER 165. Quarry accidents in the United States during the calendar year 1915, compiled by A. H. Fay. 1917. 77 pp., 1 pl.

TECHNICAL PAPER 168. Metal-mine accidents in the United States during the calendar year 1915. 1917. 114 pp., 2 figs.

Coal-mine fatalities in the United States, 1916, compiled by A. H. Fay. 1917. 42 pp.

PUBLICATIONS THAT MAY BE OBTAINED ONLY THROUGH THE SUPERINTENDENT OF DOCUMENTS.

BULLETIN 69. Coal-mine accidents in the United States and foreign countries, compiled by F. W. Horton. 1913. 102 pp., 3 pls., 40 figs. 25 cents.

TECHNICAL PAPER 27. Monthly statement of coal-mine accidents in the United States, January to August, 1912, and statistics for 1910 and 1911, compiled by F. W. Horton. 1912. 24 pp., 5 cents.

TECHNICAL PAPER 40. Metal-mine accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 54 pp. 5 cents.

TECHNICAL PAPER 48. Coal-mine accidents in the United States, 1896–1912, with monthly statistics for 1912, by F. W. Horton. 1913. 74 pp., 10 figs. 10 cents.

TECHNICAL PAPER 73. Quarry accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1914. 45 pp. 5 cents.

TECHNICAL PAPER 94. Metal-mine accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 73 pp. 10 cents.

Coal-mine fatalities in the United States during the calendar year 1915, with detailed figures for December, compiled by A. H. Fay. 1916. 80 pp., 3 figs. 10 cents.

○

Generated on 2024-09-28 17:10 GMT / https://hdl.handle.net/2027/njp.32101054990476
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from PRINCETON UNIVERSITY